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$$\therefore \$4. \frac{297}{1.003} = \$4.11137 = \$4.11137 = \text{cost price.}$$

$$\$6. \frac{1000}{33337} = \$6.33337 = \$6.33337 = \text{selling price.}$$

$$\therefore \$6.33337 - \$4.11137 = \$2.22200 = \text{gain.}$$

$$(\frac{22200}{1000000}) \text{ of } 100\% = 2.22\%.$$

Also solved by O. S. WESTCOTT and ALOIS F. KOVARIK.

113. Proposed by B. F. SINE, Principal of Normal School, Capon Bridge, W. Va.

In what time can a note of \$5280, bearing 6% interest, be paid by paying \$600 a year? [Solve by arithmetic].

Solution by WALTER H. DRANE, Graduate Student, Harvard University, Cambridge, Mass.

Let Q be the principal, r the rate, n the number of years, and P annual payment. Then

$$Q(1+r) = \text{amount due at end of first year.}$$

$$Q(1+r) - P = \text{principal to run second year.}$$

$$Q(1+r)^2 - P(1+r) = \text{amount due at end of second year.}$$

$$Q(1+r)^2 - P(1+r) - P = \text{principal to run third year.}$$

$$Q(1+r)^n - P(1+r)^{n-1} - \dots - P(1+r) - P = \text{amount to run } (n+1)\text{th year.}$$

But the debt is cancelled. Hence

$$Q(1+r)^n - P(1+r)^{n-1} - \dots - P(1+r) - P = 0.$$

$$\therefore P \left[\frac{(1+r)^n - 1}{r} \right] = Q(1+r)^n.$$

$$\therefore (P - Qr)(1+r)^n = P.$$

$$\therefore n = \frac{\log P - \log(P - Qr)}{\log(1+r)}.$$

In the problem $P = \$600$, $Q = \$5280$, $r = .06$.

$$\therefore n = \frac{\log 600 - \log(600 - 5280 \times .06)}{\log(1.06)} = 12.88 \text{ years.}$$

Also solved by G. B. M. ZERR, COOPER D. SCHMITT, and J. SCHEFFER.

ALGEBRA.

93. Proposed by CHARLES C. CROSS, Whaleyville, Va.

Given $x^x + y^y = 285$, and $y^x - x^y = 14$, to find the values of x and y . [From *Bonnycastle's Algebra*, 1841].

I. Solution by A. H. BELL, Hillsboro, Ill.

The two equations give

$$(285 - y^y)^y = (y^x - 14)^x \dots (1).$$